

ORIGINAL STUDY

The value of histopathologic score as predictive factor in choosing the optimal surgical treatment for chronic rhinosinusitis

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ABSTRACT

INTRODUCTION. Chronic rhinosinusitis (CRS) is one of the most common chronic diseases. It has a significant impact on Quality of Life (QoL) of the patients with important socio-economical consequences. Although the radical surgical procedures are applied for centuries, in the last decades endoscopic sinus surgery almost replace the radical procedures.

OBJECTIVES. Our goal was to determine the value of the histopathologic score in choosing the best surgical option in the treatment of patients with CRS.

MATERIAL AND METHODS. We performed a prospective study between 2009 and 2011 on 250 patients with maxillary chronic rhinosinusitis with a minimum follow-up period of one year. Biopsies from maxillary sinus mucosa were taken during the pre-operative sinusoscopy through inferior meatus and analyzed in our Histopathology Department. The histopathologic parameters that were taken in consideration were the density and distribution of the inflammatory infiltrate, eosinophils presence, intramucosal oedema presence, neoformation vessels presence (neoangiogenesis), and fibrosis. Based on these parameters, the patients were categorized in four groups, each group being treated in accordance with the severity of the disease with medical treatment, endoscopic or external Caldwell-Luc approaches. All the patients were assessed pre- and post-therapeutically using a visual-analogue scale (VAS), the therapeutic success being defined in terms of normalization of the symptomatology at one year follow-up.

RESULTS. The results showed that the therapeutic success was similar in all four groups, with success rates between 87.5% to 95.45%. The increase of HP score was correlated with the decrease of endoscopic surgery success rate.

CONCLUSIONS. Even if the study is limited only at the maxillary sinus, the results showed a good correlation between the HP score as predictive factor in choosing the type of the surgical approach in the treatment of CRS.

KEYWORDS: chronic rhinosinusitis, histopathologic score, ESS

INTRODUCTION

Chronic rhinosinusitis (CRS) with or without polyps is one of the most frequent chronic conditions, affecting 5% to 15% of the urban community in Europe and around 12% to 15% of the population in United States. It affects preponderant the social active segment of population, so it has important socio-economic consequences (extensive cost to society in term of use of health care resources, loss productivity and absence from the workplace)^{1,2}. So, the logically motivation is to find the best treatment option to heal the disease and to have no recurrences.

Surgical treatment is indicated after failure of the medical therapy. Radical operations such Caldwell-Luc has been widely performed in the world for many years with good results. It is based on opening of the sinuses using an external approach and extensive removal of inflamed mucosa³. Introduction of the endoscopically guided powered instrumentation on the mid 1980's has revolutionized the surgical treatment. This can be done in different ways, from minimally invasive surgical technique (MIST), to Functional Endoscopic Sinus Surgery (FESS) or Endoscopic Sinus Surgery (ESS).

Until now, there are no standardizations on which surgical technique is the best treatment alternative in

case of various types of chronic rhinosinusitis. There is still debate whether radical sinus surgery is a feasible last treatment option in cases of therapy resistant chronic rhinosinusitis to achieve improvement of quality of life and reduction of symptoms². The question remains if there is any place for radical surgery in the endoscopic era.

Some previous studies identified that eosinophils count correlate with objective disease severity as defined by CT, endoscopy⁴. Considering the histopathologic aspect of biopsies taken during the surgical procedures, we analyzed the modifications appeared in sinus mucosa and how these correlates with the severity of disease and the surgical treatment. So, our goal was to determine the role of histopathologic score as prognostic factor for the type of surgical treatment used in CRS.

MATERIAL AND METHODS

We performed a prospective study between 2009 and 2011 on 250 patients with maxillary chronic rhi-

nosinusitis. Biopsies from maxillary sinus mucosa of all the patients were taken during the pre-operative sinusoscopy through inferior meatus and analyzed in our Histopathology Department.

The **inclusion criteria** of the study were:

1. Adult patients with age > 18 years
2. Chronic maxillary rhinosinusitis with medical therapy failure
3. Indication for sinus surgery
4. Symptomatology VAS > 3 cm

Exclusion criteria

1. Complications of chronic rhinosinusitis
2. Associated diseases (ex. malignancies, cystic fibrosis, diabetes, tuberculosis etc.)
3. Anatomic abnormalities of the nose and paranasal sinus
4. Tumors
5. Unilateral polyps
6. Pregnancy and lactation
7. Symptomatology VAS ≤ 3 cm

Each histopathologic sample was assessed taken into consideration the following parameters:

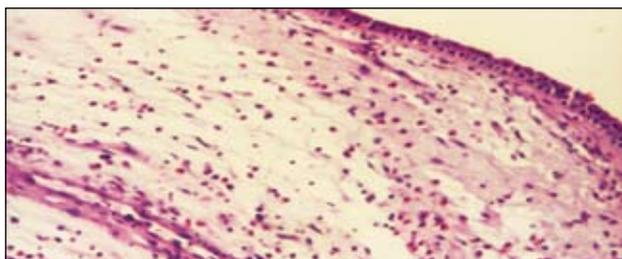


Figure 1a HP exam - rare, spread lymphoid elements

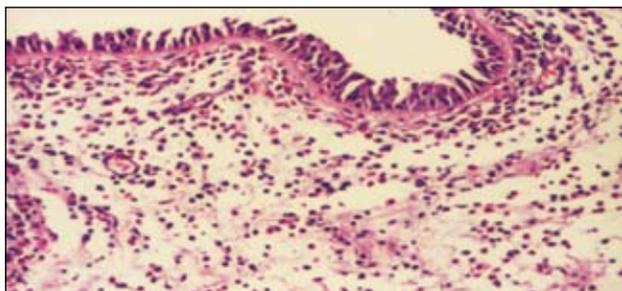


Figure 1b HP exam - frequent, spread lymphoid elements

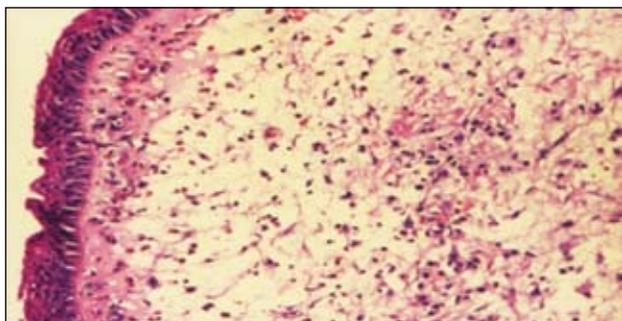


Figure 2a HP exam - rare eosinophils

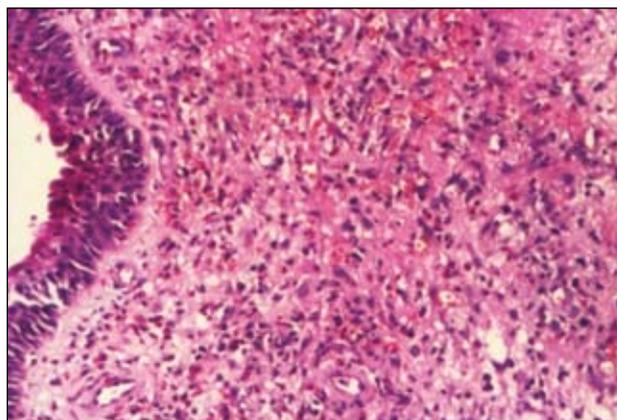


Figure 1c HP exam - lymphoid elements, subepithelial densification +/- perivascular or aggregate presence

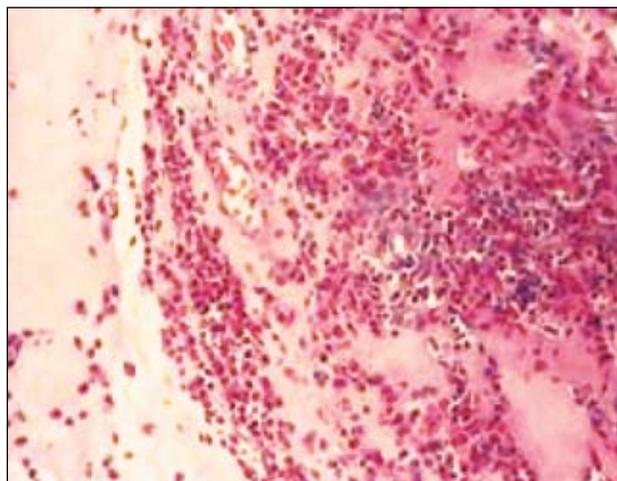


Figure 2b HP exam - frequent eosinophils

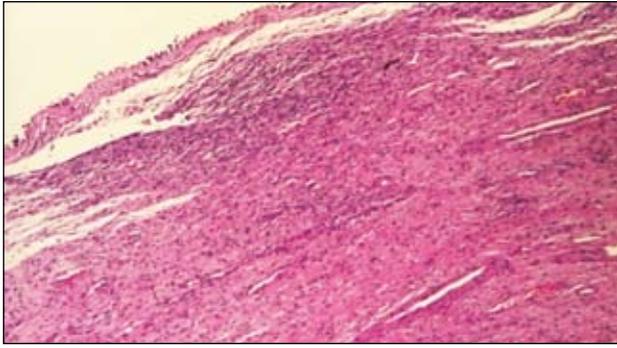


Figure 3a Minimal subepithelial oedema

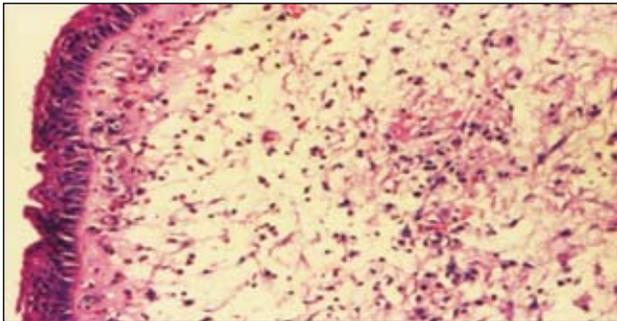


Figure 3b Moderate subepithelial oedema

- the density and distribution of the inflammatory infiltrate
- eosinophils presence
- intramucosal oedema presence
- neoformation vessels presence (neoangiogenesis)
- fibrosis

For each histopathologic parameter we assigned a number of points, in accordance with its density, as follows:

- for the **density and distribution of the inflammatory infiltrate**:

- ✓ 1 point: rare, spread lymphoid elements (Figure 1a)

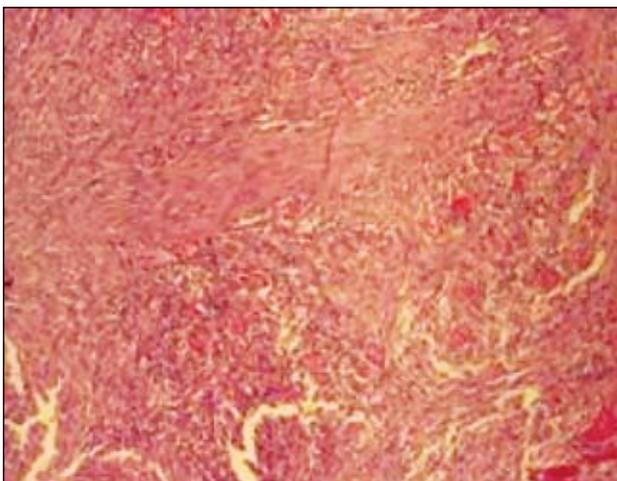


Figure 4a Frequent vessels

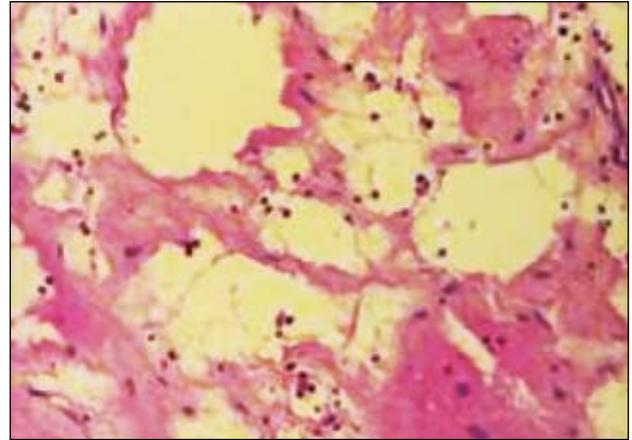


Figure 3c Marked subepithelial oedema

- ✓ 2 points: frequent, spread lymphoid elements (Figure 1b)

- ✓ 3 points: frequent lymphoid elements, subepithelial densification +/- perivascular or aggregate presence (Figure 1c)

- for the eosinophils presence:

- ✓ 0 point: absence of eosinophils

- ✓ 1 point: rare eosinophils (Figure 2a)

- ✓ 2 points: frequent eosinophils (Figure 2b)

- for the intramucosal oedema presence

- ✓ 0 point: absent

- ✓ 1 point: minimal subepithelial oedema (Figure 3a)

- ✓ 2 points: moderate oedema (Figure 3b)

- ✓ 3 points: marked oedema (Figure 3c)

- for the neoformation vessels presence

- ✓ 1 point: few vessels

- ✓ 2 points: frequent vessels (Figure 4a)

- ✓ 3 points: frequent vessels with thick walls due to fibrosis (wall and perivascular fibrosis) (Figure 4b)

- for the fibrosis (independent parameter)

- ✓ 0 point: absence

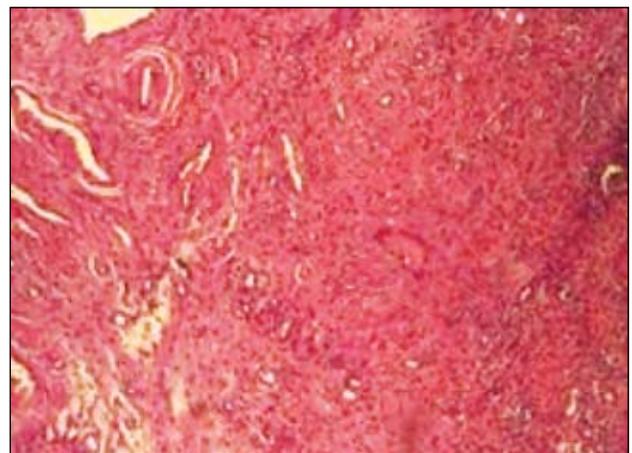


Figure 4b Frequent vessels with thick walls due to fibrosis (wall and perivascular fibrosis)

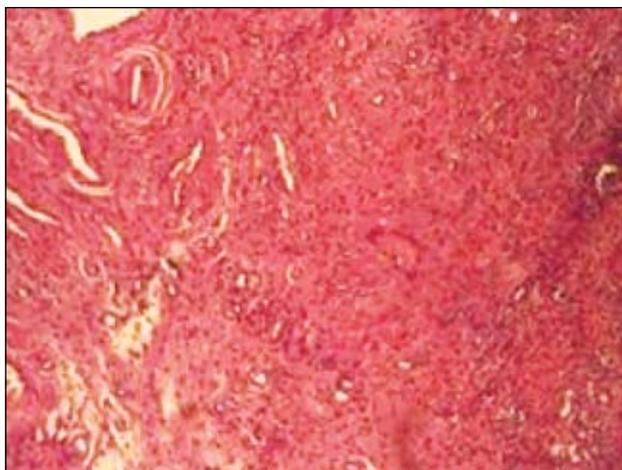


Figure 5a Minimally - periglandular +/- intramucosal fibrosis

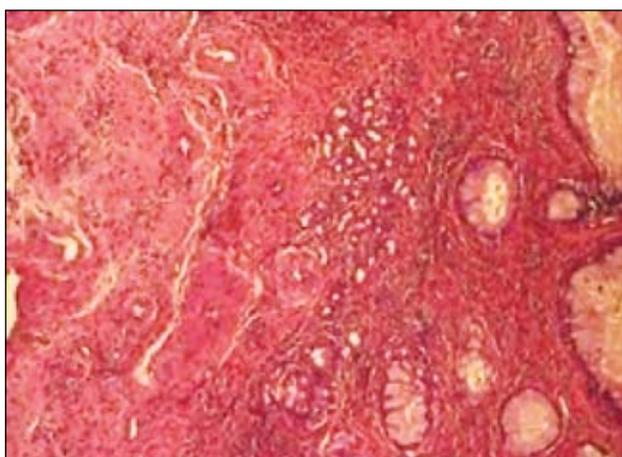


Figure 5b Moderate fibrosis with cystic gland dilatation

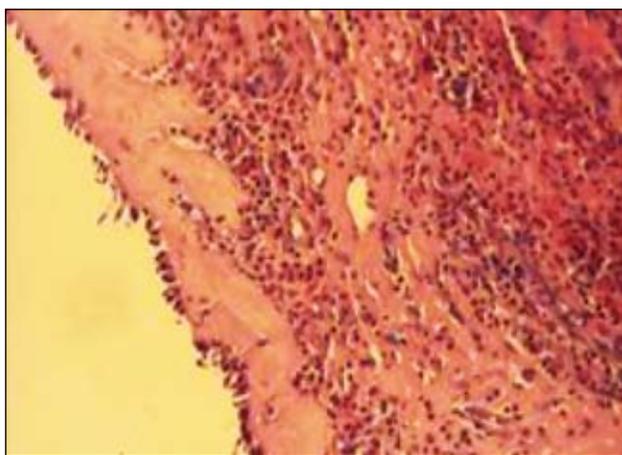


Figure 5c Marked with irreversible mucosal hyperplasia

- ✓ 1 point: minimally - periglandular +/- intramucosal (Figure 5a)
- ✓ 2 points: moderate with cystic gland dilatation (Figure 5b)
- ✓ 3 points: marked with irreversible mucosal hyperplasia (Figure 5c)

By calculating the total number of points obtained from each patient by adding the scores of each individual parameter, we obtained a histopathological score ranging between 0-11 points.

In accordance with the severity of the histopathologic impairment, we divided the patients in four groups, as following:

- Group I Normal : 0-3
- Group II Mild impairment: 3-7
- Group III Moderate impairment: 7-10
- Group IV Maximal impairment: 11

For each histopathologic group, we individualized the treatment as following:

- For the **Group I patients - medical treatment** (methylprednisolonum 32 mg, 7 days/months, 3 consecutive months, and mometasone furoate monohydrate for 12 months);

- For the **Group II patients - functional endoscopic sinus surgery (FESS)** - opening of the natural ostium of the maxillary sinus (middle meatal antrostomy, aspiration and lavage with saline solution of the maxillary sinus);

- For the **Group III patients - endoscopic sinus surgery (ESS)** - middle meatal antrostomy, followed by ablation of the pathological modification from the maxillary sinus (cysts, polyps, etc.);

- For the **Group IV patients** - external Caldwell-Luc approaches.

All the surgical patients received a short course of systemic antibiotics (5 days), nasal crusts removal and aspirations of the nasal secretions - daily, for 7 days postoperative. Also, nasal lavage with saline solution was performed for two months, and all the patients received topic nasal steroids (mometasone furoate monohydrate) for three months, starting after one month postoperative.

The follow-up period was 12 months. We performed nasal endoscopy at 1, 3, 6 and 12 months postoperative. The assessment of the treatment efficacy was performed using a visual-analog scale (VAS) of overall symptomatology (the patients were asked to mark on a 10 cm scale how bothersome are the nasal symptoms, preoperative and at 1, 3, 6 and 12 months postoperative). According to the inclusion/exclusion study criteria, in this study were included only the patients with VAS > 3 cm.

The therapeutic success was considered if at 1 year postoperative the VAS was ≤ 3 cm.

RESULTS

A total of 250 patients with CRS were included in the study. Mean age was 44.3 years, with 90.8% of them with ages between 18 and 65 years. The sex ratio was: males 50.85%, females 49.14% (Figure 6).

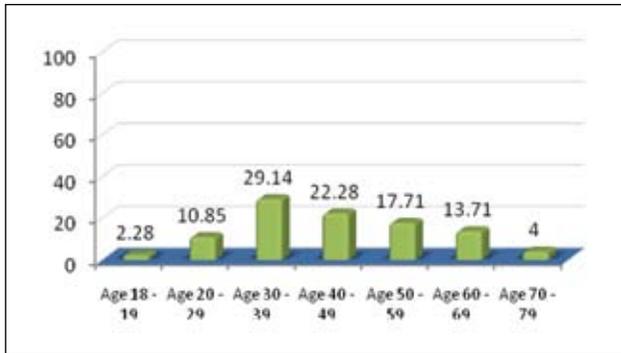


Figure 6 Age distribution

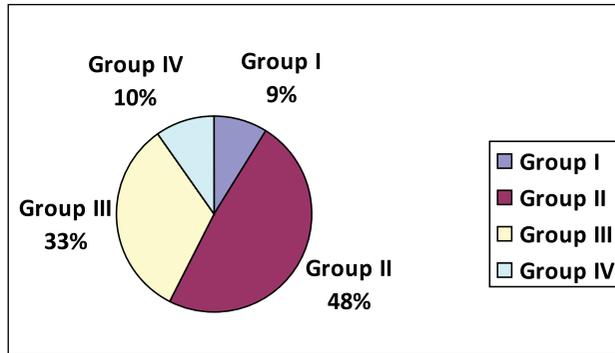


Figure 7 Patients distribution according to the HP score

The distribution between the four groups of patients was as follows (Figure 7):

- Group I: 22 patients
- Group II: 122 patients
- Group III: 82 patients
- Group IV: 24 patients

In the first group of patients the pre-treatment evaluation of the symptoms showed a VAS score of 5.3 cm, this one being smaller than the rest of patients (5.6 cm in group II, 6.2 cm in group III and 7.2 cm in group IV). This is showing a correlation between the severity of the histopatologic aspect and the severity of the disease (Figure 8, Table 1).

The decrease of the postoperative VAS score in all the groups of the patients indicates that the histopatologic score had a good prognostic value in choosing the best surgical alternative in accordance with the severity of the disease. In this regard, the endoscopic techniques (FESS or ESS), used in 204 patients (89.5% of the surgical patients), showed very good results in terms of improving the quality of life of the patients with chronic maxillary sinusitis, with significant decrease of VAS score (Figure 8, Table 1).

Also, even in “the endoscopic era”, there is still space for external approach. 24 of our patients (9.6%), with maximal HP score (11 points), under-

went Caldwell-Luc approaches, with favorable results, in terms of significant decrease of VAS score.

The therapeutic success rate, measured by the decrease of VAS score under 3 cm at 1 year postoperative, was good using all surgical techniques (Table 2). The endoscopic approach techniques had very good results, with cure in terms of decreasing the symptomatology in over 93% of patients. Also, the external approach had very good results, only 12.5% (three patients) showing a VAS score over 3 cm.

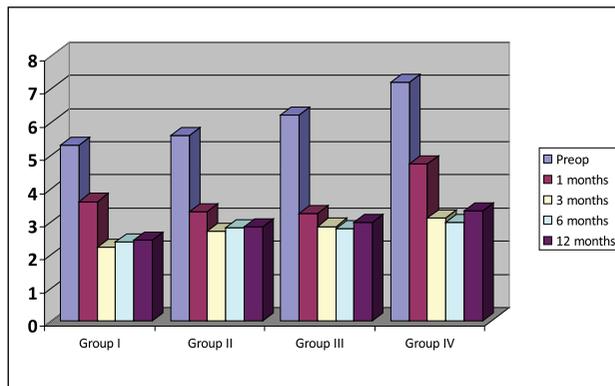


Figure 7 Pre- and postoperative evaluation of patients with chronic maxillary sinusitis using VAS scale

Table 1
Pre- and postoperative evaluation of patients with chronic maxillary sinusitis using VAS scale

	Group I	Group II	Group III	Group IV
Preop.	5.3	5.6	6.2	7.2
1 month	3.6	3.3	3.23	4.73
3 months	2.21	2.71	2.85	3.11
6 months	2.38	2.8	2.78	2.97
12 months	2.43	2.84	2.96	3.32

Table 2
Therapeutic success rates in measured using VAS scale

VAS Score at 1 year postop.	Group I	Group II	Group III	Group IV
VAS ≤ 3 cm	21 pts.	115 pts.	77 pts.	21 pts.
VAS >3 cm	1 pt.	7 pts.	5 pts.	3 pts.
	95.45 %	94.26 %	93.9 %	87.5 %
	Success rate			

DISCUSSIONS

In this study we discuss about two types of surgical treatment - Caldwell-Luc procedure used intensively before 1980's and endoscopic sinus surgery as the new approach in the last decades. Before Messerklinger, it was believed that mucosal damage found in CRS is irreversible - this was the reason why procedures such Caldwell-Luc involved stripping of the sinus mucosa was the golden standard. Stamberger showed that once the transition spaces are cleared of disease, the larger sinuses usually heal without being touched, even if mucosal damage seemed "almost irreversible"⁶.

The goal was to identify parameters to establish good indications for which treatment to choose, in our case if there is any place for radical surgery, even there are a lot of pro-factors that promote the endoscopic surgery⁷.

Impairment in QoL was observed pre-therapeutically in all four groups of patients. After 6 months of follow-up, we observed important improvements in QoL; another study showed that a follow-up of 6 months after endoscopic sinus surgery should be enough and improvements in QoL and endoscopy do not appear to change between 6 and 20 months⁸.

From results we observed that an increased of HP score is correlated with the decreased of endoscopic success rate. Introduction of radical surgery for the group with maximum HP score, showed a major improvement.

Further studies should be done to determine if these results can be applied on ethmoidal or sphenoidal rhinosinusitis.

CONCLUSIONS

Even if the study is limited only at the maxillary sinus, the results showed a good value of the HP score as predictive factor in choosing the type of the surgical approach in the treatment of CRS.

Both surgical external and internal procedures are effective in treatment of CRS after medical failure. As showed HP score can be an important and easy tool to associate with success of surgical treatment and to orientate which treatment to use.

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